Health Status Outcomes in Patients Presenting for Coronary Angiography for the Evaluation of Chest Pain

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Table of Contents

Table of Contents ..... **III**

Abstract ..... **VI**

Declaration ..... **IX**

Acknowledgments ..... **XI**

Abbreviations ..... **XIII**

Statements of Authorship of Jointly Authored Papers Presented within this Thesis ..... **XVII**

List of Publications and Presentations ..... **XXI**

Preface ..... **XXX**

CHAPTER I. BACKGROUND **1**

1. THE SYMPTOM OF CHEST PAIN **2**

1.1 Chest Pain Epidemiology **2**

1.2 Causes of Chest Pain **3**

1.3 Evaluating Chest Pain **6**

2. CORONARY HEART DISEASE **8**

2.1. Coronary Heart Disease – A Changing Epidemiology **9**

2.2. Angina Pectoris – A Key Symptom for CHD **10**

2.2.1. Clinical Forms of Angina 10

2.2.2. Angina Definitions 12

2.3. Pathophysiology of Coronary Heart Disease **14**

2.3.1. Myocardial Ischaemia 16

2.4. The Coronary Angina Syndromes **18**

2.4.1. Acute Myocardial Infarction 19

2.4.2. Specific Anginal Syndromes 20

2.5. Diagnostic Assessment of Coronary Heart Disease **22**

2.5.1 Coronary Artery Assessment 23

2.5.2. Myocardial Ischaemia Assessment 25

2.5.3. Coronary Blood Flow Assessment 26

2.5.4. Myocardial Contractility and Perfusion Studies 27

2.6. Management Strategies in Coronary Heart Disease **28**

3. CHEST PAIN AND NORMAL CORONARY ANGIOGRAPHY **33**

3.1. Epidemiological Considerations **33**

3.2. Differential Diagnosis **33**

3.3. Coronary Microvascular Disorders **34**

3.3.1. Cardiac Syndrome X (Syndrome X) 35

3.3.2. Microvascular Angina 36

3.3.3. Coronary Slow Flow Phenomenon 36

4. HEALTH STATUS ASSESSMENT **38**

4.1. General Concepts in Health Outcomes **38**

4.1.1. Defining Health Outcomes 38

4.1.2. The Evolution of Health–Related Quality of Life 41

4.1.3. Health–Related Quality of Life Questionnaires 42

4.2. Applying Health Outcomes in Coronary Heart Disease **51**

4.2.1. Cardiac Disease Outcomes 51

4.2.2. Health Status Outcomes 54

5. THESIS OBJECTIVES **81**

CHAPTER II **83**

Natural History of Patients with Insignificant Coronary Artery Disease **84**

CHAPTER III **110**

Quality of life in Stable Coronary Artery Disease Patients Treated with Percutaneous Coronary Intervention (PCI) or Medical Therapy **111**

CHAPTER IV **135**

Using the Short Form–36 Mental Summary Score as an Indicator of Depressive Symptoms in Coronary Heart Disease Patients **136**

CHAPTER V **157**

Quality of Life and Cardiac Rehabilitation in Patients with Coronary Artery Disease **158**

CHAPTER VI. CONCLUSION **178**

APPENDICES **191**

Appendix A **192**

Health–Related Quality of Life Instruments Used **192**

Appendix B **202**

Supplementary Data: Chapter II **202**

Appendix C **204**

Copyright Permissions **204**

References **207**

Abstract

Background and Objectives: This thesis investigates health outcomes among patients undergoing coronary angiography for the assessment of chest pain. In particular, this research focuses on health status in relation to the presence/absence of significant coronary artery disease (CAD) on angiography, management strategies initiated following the procedure, and self–reported patient depression status. Health status refers to measurement of patient symptoms, their associated limitation on physical/mental functioning and the impact on health–related quality of life (HRQoL). The specific objectives include: (1) comparing the 12–month health status of patients undergoing coronary angiography with insignificant CAD (ICAD) to those with (i) significant CAD and (ii) healthy individuals with no history of coronary heart disease (CHD); (2) evaluating the health status in stable CAD patients who undergo percutaneous coronary intervention (PCI) or medical therapy (MT) as initial management strategies; (3) to develop and validate a procedure for identifying a depressed patient cohort using generic HRQoL data; and (4) evaluate the influence of cardiac rehabilitation (CR) on HRQoL in CAD patients.

Methods. This thesis employs a number of methods to evaluate patient outcomes. Although cardiac events (death and myocardial infarction) have been undertaken, the major end points assessed primarily focus upon patient–reported health status measures derived from both generic and disease–specific instruments including the Short Form–36 (SF-36), Seattle Angina Questionnaire (SAQ), and the Centre for Epidemiological Studies– Depression scale (CES–D). Both cross–sectional and longitudinal analyses have been conducted with appropriate statistical analyses employed. Cross–sectional

analyses were age–adjusted where appropriate and primarily utilised logistic or linear regression as relevant to the analysed outcome. Longitudinal data was analysed as panel data, utilising ordinary least squares regression with the appropriate fixed effects or random effects model.

Summary of Major Findings. The above study objectives yielded the following findings:

1) Patients with stable chest pain and ICAD on angiography, have a similar health status 12 months following index angiography as those who have obstructive CAD. Furthermore, both these groups have a poorer HRQoL than healthy individuals who have never had chest pain (Chapter 2).

2) In patients with stable angina and obstructive CAD, those treated with PCI undergo an initial greater improvement in health status. However, patients treated with MT also undergo a similar but delayed improvement, so that by six–months there is no differences in health status between the two treatment groups (Chapter 3).

3) In patients with CHD who have undertaken an SF–36 questionnaire, the mental component summary score (MCS) was found to have high sensitivity and specificity in identifying depressed patients as defined by the CES–D. Threshold values for depression were ascertained and validated in two independent cohorts (Chapter 4).

4) In CHD patients, CR is more often undertaken on patients with a recent myocardial infarct with the more disabled chronic angina patients infrequently undergoing this therapy. Furthermore in a prospective cohort study, CR was not found to influence patient–reported health status in CHD patients (Chapter 5).

Conclusion: This thesis underscores the underlying premise that "angiographic appearance" does not govern health status. Exploration of novel strategies to manage health status burden more effectively are required. This may include depression management having a more prominent role in patient care or a more targeted approach to CR allocation. Lastly, future studies investigating what factors contribute to health status improvement are needed.

Declaration

This work contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text.

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* Tavella R, Air T, Tucker G, Adams R, Beltrame JF, Schrader G. Using the Short–Form 36 as an Indicator of Depressive Symptoms in Coronary Heart Disease Patients. Quality of Life Research 2010 Oct;19(8):1105–13

* Beltrame JF, Tavella R, Cutri N. Quality of life with PCI versus medical therapy in stable coronary disease. N Engl J Med 2008 Nov 20;359(21):2289–90

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Abbreviations

ACC – American College of Cardiology

ACE – angiotensin– converting enzyme

ACME – Angioplasty Compared with Medical Therapy

ACS – acute coronary syndrome

AHA – American Heart Association

AMI – acute myocardial infarction

APQLQ – Angina Pectoris Quality of Life Questionnaire

AUC –area under the curve

BDI – Beck Depression Inventory

BP – bodily pain

CABG – coronary artery bypass grafting

CAD – coronary artery disease

CCSC – Canadian Cardiovascular Society Classification

CES–D – Centre for Epidemiologic Studies Depression Scale

CHD – coronary heart disease

CK – Creatine Kinase

COURAGE – Clinical Outcomes Utilising Revascularisation and Aggressive Drug Evaluation

CSA – chronic stable angina

CSFP – coronary slow flow phenomenon

DM – diabetes mellitus

DSM – Diagnostic and Statistical Manual of Mental Disorders

ECG – electrocardiogram

ESC – European Society of Cardiology

FDG – fluordeoxglucose

GDS – Geriatric Depression Scale

GH – general health

HADS – Hospital Anxiety and Depression Scale

HRQoL – health–related quality of life

HT/Chol – hypertension and/or high cholesterol

ICAD – insignificant CAD

ICD – International Classification of Diseases

IDACC – Identifying Depression as a Comorbid Condition

LV – left ventricular

MACE – major adverse cardiac events

MCS – mental component summary score

MH – mental health

MONICA – Monitoring Trends and Determinants in Cardiovascular Disease

MOS – Medical Outcomes Study

MRI – magnetic resonance imaging

MT – medical therapy

NHP – Nottingham Health Profile

NPV – negative predictive value

NSTEMI – non–ST elevation myocardial infarction

NWAHS – North Western Adelaide Health Service

OMT – optimal medical therapy

PCI – percutaneous coronary intervention

PCS – physical component summary score

PET – positron emission tomography

PF – physical functioning

PHQ – Patient Health Questionnaire

PPV – positive predictive value

PTCA – percutaneous transluminal coronary angioplasty

QALY – quality–adjusted life years

QLM – Quality of Life after Myocardial Infarction

RAQ – Rose Angina Questionnaire

RCT – randomised clinical trial

RLE – role limitations emotional

RLP – role limitations physical

ROC – receiver operating characteristic

SAQ – Seattle Angina Questionnaire

SCID – Structured Clinical Interview for DSM Disorders

SDS – Self Rating Depression Scale

SF – social functioning

SF–36 – Short–Form 36

SIP – Sickness Impact Profile

SPECT – single photon emission computed tomography

STEMI – ST elevation myocardial infarction

TIMI – Thrombolytic in Myocardial Infarction

TQEH – The Queen Elizabeth Hospital

UA – unstable angina

US – United states

VT – vitality

WHO – World Health Organisation

WISE – Women's Ischemic Syndrome Evaluation

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Patients With Stable Coronary Artery Disease Have Impaired Quality of Life Compared to Acute Coronary Syndrome Patients.

Heart, Lung and Circulation, *Volume 17, Supplement 3*, *2008*, *Page S208*

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Gender Differences in Quality of Life Indices Amongst Patients with Coronary Artery Disease.

Heart, Lung and Circulation, *Volume 17, Supplement 3*, *2008*, *Page S25*

2008

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Gender Differences Amongst Patients with Chest Pain and Non–Obstructive Coronary Artery Disease.

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2011

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Women Experience Significant Treatment Delays when Presenting with Acute Myocardial Infarction.

American Heart Association, Quality of Care and Outcomes Research (QCOR) Conference. May 12th – 14th 2011, Washington D.C, United States.

2011

Dreyer R*, **Tavella R**, Hoffmann B, Pati P, Beltrame JF, Arstall M, Zeitz C.

Do Cardiac Haemodynamic Differences in Patients with Acute ST-Elevation Myocardial Infarction Contribute to Gender Differences in Outcomes?

American Heart Association, Quality of Care and Outcomes Research (QCOR) Conference. May 12th – 14th 2011, Washington D.C, United States.

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In, Kaski, JC, Eslick GD, and C. Noel, BM (Eds.), *Chest Pain with Normal Coronary Arteries: A Multidisciplinary Approach (1st Edition)*. New York, United States: Springer Science + Business Media. In press

2011

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Quality of life of patients with peripheral arterial disease and chronic stable angina.

Angiology. 2011, Jul [Epub ahead of print]

2011

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Gender Differences in Patients with Stable Angina attending Primary Care Practices.

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2009

Beltrame JF, Weekes AJ, Morgan C, **Tavella R**, Spertus JA.

The prevalence of weekly angina among patients with chronic stable angina in primary care practices: The Coronary Artery Disease in General Practice (CADENCE) Study.

Arch Intern Med. 2009 Sep 14;169(16):1491–9.

Preface

Chest pain is a common and costly symptom, attributable to a range of cardiac and non–cardiac aetiologies. Among patients seeking physician advice or presenting to hospital emergency departments, chest pain is of cardiac origin, either ischaemic or non–ischaemic in nature, in approximately half of the cases[1]. Although chest pain may be caused by a number of cardiac conditions, chest pain due to coronary heart disease (CHD), *angina pectoris*, is by the far the most common cardiac clinical manifestation[2].

When chest pain is indicative of angina, cardiological investigations firstly involve establishing the presence of CHD and secondly, risk stratifying patients in relation to their risk of cardiac events. Coronary angiography is the clinical benchmark for the diagnosis of CHD, allowing for a definitive identification of coronary artery disease (CAD) and the assessment of anatomical severity. In patients with significant CAD, treatment strategies are well defined and frequently involve coronary revascularisation therapies. However, in patients who show no significant disease or "normal" coronary angiography, management strategies are unclear, and the chest pain is commonly considered to be "non–cardiac" in nature.

The management of patients with CHD focuses upon (a) prevention of cardiac events – death, and myocardial infarction, and (b) improving patient health status – angina, functional limitations and quality of life. Considerable focus has been directed towards coronary arterial disease and thus the natural history of patients with significant CAD is well documented. Many medical and revascularisation therapies have also been investigated for their prognostic and symptomatic benefits in these patients. On the

other hand, the natural history of patients with insignificant CAD is poorly understood. Few studies have assessed the outcomes of patients with normal coronary angiography, and although the prognosis of these patients is generally thought to be favourable[3], this has been inadequately assessed, particularly in relation to patient health status.

In this thesis, an examination on health status in patients undergoing coronary angiography for the evaluation of chest pain is presented. Central to the thesis, is a single centre 1200 patient database, prospectively collected for this thesis, recruiting patients undergoing angiography for the evaluation of chest pain and subsequently followed for a 12 month period. To provide suitable background for this work, the introductory chapter addresses the following: the differential causes and evaluation of chest pain. Secondly, an overview of CHD – the most common cardiac cause of chest pain is undertaken. In relation to this, the associated pathophysiology of angina pectoris, the clinical manifestations, diagnostic modalities and therapies available are summarised. Thirdly, as a particular focus of this thesis is on patients with chest pain and normal angiography, a summary of contemporary understanding of this field is presented, including its epidemiology, pathophysiology and clinical manifestations. Lastly, the major tool utilised in this thesis are health status instruments. This research does not examine cardiac events as the included studies are insufficiently powered and accordingly, these aspects are beyond the scope of this thesis. An overview of patient–reported health status in CHD settings is undertaken, as well as a summary of the psychometric properties of the available instruments.

The investigational chapters detailed in the thesis address particularly the aspects of health status in patients undergoing angiography for the evaluation of chest pain or those with documented CHD. In the concluding chapter, the common themes that have been illustrated by these investigational studies are summarised.